

What is claimed is:

1. A power supply for an implantable cardioverter-defibrillator for subcutaneous positioning between the third rib and the twelfth rib and using a lead system that does not directly contact a patient's heart or reside in the intrathorasic blood vessels and for providing anti-bradycardia pacing energy to the heart, the power supply comprising:

a capacitor subsystem for storing the anti-bradycardia pacing energy for delivery to the patient's heart; and

a battery subsystem electrically coupled to the capacitor subsystem for providing the anti-bradycardia pacing energy to the capacitor subsystem.

2. The power supply of claim 1, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 500 volts.

3. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 25 volts.

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4. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 25 volts to approximately 50 volts.

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5. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 50 volts to approximately 75 volts.

6. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 75 volts to approximately 100 volts.

7. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 100 volts to approximately 150 volts.

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8. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 150 volts to approximately 200 volts.

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9. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 200 volts to approximately 250 volts.

10. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 250 volts to approximately 300 volts.

11. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 300 volts to approximately 350 volts.

12. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 350 volts to approximately 400 volts.

13. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform

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having a peak voltage that is approximately 400 volts to approximately 450 volts.

14. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 450 volts to approximately 500 volts.

15. The power supply of claim 1, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 2 milliseconds to approximately 40 milliseconds.

16. The power supply of claim 15, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 2 milliseconds to approximately 10 milliseconds.

17. The power supply of claim 15, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 10 milliseconds to approximately 20 milliseconds.

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18. The power supply of claim 15, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 20 milliseconds to approximately 30 milliseconds.

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19. The power supply of claim 15, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 30 milliseconds to approximately 40 milliseconds.

20. The power supply of claim 1, wherein the anti-bradycardia pacing energy comprises a biphasic waveform further comprising a positive voltage portion and a negative voltage portion.

21. The power supply of claim 18, wherein the positive voltage portion further comprises a tilt of approximately 10% to approximately 90%.

22. The power supply of claim 19, wherein the tilt is approximately 50%.

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23. The power supply of claim 18, wherein the negative voltage portion further comprises a tilt of approximately 10% to approximately 90%.

5 24. The power supply of claim 21, wherein the tilt is approximately 50%.

25. The power supply of claim 1, wherein the anti-bradycardia pacing energy comprises a biphasic waveform that is provided at a rate of approximately 40 to approximately 120 stimuli/minute.

26. The power supply of claim 25, wherein the biphasic waveform is provided after a patient's heart rate is equal or less than approximately 20 beats/minute.

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27. A voltage output system for an implantable cardioverter-defibrillator for subcutaneous positioning between the third rib and the twelfth rib and using a lead system that does not directly contact a patient's heart or reside in the intrathorasic blood vessels and for providing anti-bradycardia pacing energy to the heart, the power supply comprising:

an energy storage system for storing the anti-bradycardia pacing energy for delivery to the patient's heart; and

an energy source system electrically coupled to the capacitor subsystem for providing the anti-bradycardia pacing energy to the capacitor subsystem.

28. The voltage output system of claim 27, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 500 volts.

29. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 25 volts.

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30. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 25 volts to approximately 50 volts.

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31. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 50 volts to approximately 75 volts.

32. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 75 volts to approximately 100 volts.

33. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 100 volts to approximately 150 volts.

34. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 150 volts to approximately 200 volts.

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35. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 200 volts to approximately 250 volts.

36. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 250 volts to approximately 300 volts.

37. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 300 volts to approximately 350 volts.

38. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 350 volts to approximately 400 volts.

39. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic

waveform having a peak voltage that is approximately 400 volts to approximately 450 volts.

5 40. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 450 volts to approximately 500 volts.

10 41. The voltage output system of claim 27, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 2 milliseconds to approximately 40 milliseconds.

15 42. The voltage output system of claim 41, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 2 milliseconds to approximately 10 milliseconds.

20 43. The voltage output system of claim 41, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 10 milliseconds to approximately 20 milliseconds.

44. The voltage output system of claim 41, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 20 milliseconds to approximately 30 milliseconds.

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45. The voltage output system of claim 41, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 30 milliseconds to approximately 40 milliseconds.

46. The voltage output system of claim 27, wherein the anti-bradycardia pacing energy comprises a biphasic waveform further comprising a positive voltage portion and a negative voltage portion.

47. The voltage output system of claim 46, wherein the positive voltage portion further comprises a tilt of approximately 10% to approximately 90%.

48. The voltage output system of claim 47, wherein the tilt is approximately 50%.

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49. The voltage output system of claim 46, wherein the negative voltage portion further comprises a tilt of approximately 10% to approximately 90%.

5 50. The voltage output system of claim 49, wherein the tilt is approximately 50%.

10 51. The voltage output system of claim 27, wherein the anti-bradycardia pacing energy comprises a biphasic waveform that is provided at a rate of approximately 40 to approximately 120 stimuli/minute.

15 52. The voltage output system of claim 51, wherein the biphasic waveform is provided after a patient's heart rate is equal or less than approximately 20 beats/minute.

20 53. An implantable cardioverter-defibrillator for subcutaneous positioning between the third rib and the twelfth rib within a patient, the implantable cardioverter-defibrillator comprising:

a housing having an electrically conductive surface on an outer surface of the housing;

a lead assembly electrically coupled to the housing and having an electrode, wherein the lead assembly does not

directly contact the patient's heart or reside in the intrathorasic blood vessels;

5 a capacitor subsystem located within the housing and electrically coupled to the electrically conductive surface and the electrode for storing anti-bradycardia pacing energy and for delivering the anti-bradycardia pacing energy to the patient's heart through the electrically conductive surface and the electrode; and

a battery subsystem electrically coupled to the capacitor subsystem for providing the anti-bradycardia pacing energy to the capacitor subsystem.

10 54. The implantable cardioverter-defibrillator of claim 53, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 500 volts.

15 55. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 25 volts.

20 56. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy

comprises a biphasic waveform having a peak voltage that is approximately 25 volts to approximately 50 volts.

57. The implantable cardioverter-defibrillator of
5 claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 50 volts to approximately 75 volts.

58. The implantable cardioverter-defibrillator of
10 claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 75 volts to approximately 100 volts.

59. The implantable cardioverter-defibrillator of
15 claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 100 volts to approximately 150 volts.

20 60. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 150 volts to approximately 200 volts.

61. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 200 volts to approximately 250 volts.

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62. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 250 volts to approximately 300 volts.

63. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 300 volts to approximately 350 volts.

64. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 350 volts to approximately 400 volts.

65. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 400 volts to approximately 450 volts.

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66. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 450 volts to approximately 500 volts.

67. The implantable cardioverter-defibrillator of claim 53, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 2 milliseconds to approximately 40 milliseconds.

68. The implantable cardioverter-defibrillator of claim 67, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 2 milliseconds to approximately 10 milliseconds.

69. The implantable cardioverter-defibrillator of claim 67, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 10 milliseconds to approximately 20 milliseconds.

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70. The implantable cardioverter-defibrillator of claim 67, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 20 milliseconds to approximately 30 milliseconds.

71. The implantable cardioverter-defibrillator of claim 67, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 30 milliseconds to approximately 40 milliseconds.

72. The implantable cardioverter-defibrillator of claim 53, wherein the anti-bradycardia pacing energy comprises a biphasic waveform further comprising a positive voltage portion and a negative voltage portion.

73. The implantable cardioverter-defibrillator of claim 72, wherein the positive voltage portion further comprises a tilt that is approximately 10% to approximately 90%.

74. The implantable cardioverter-defibrillator of claim 73, wherein the tilt is approximately 50%.

75. The implantable cardioverter-defibrillator of claim 72, wherein the negative voltage portion further comprises a tilt of approximately 10% to approximately 90%.

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76. The implantable cardioverter-defibrillator of claim 75, wherein the tilt is approximately 50%.

77. The implantable cardioverter-defibrillator of claim 53, wherein the anti-bradycardia pacing energy comprises a biphasic waveform that is provided at a rate of approximately 40 to approximately 120 stimuli/minute.

78. The implantable cardioverter-defibrillator of claim 77, wherein the biphasic waveform is provided after a patient's heart rate is equal or less than approximately 20 beats/minute.

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79. A method for supplying power for an implantable cardioverter-defibrillator for subcutaneous positioning between the third rib and the twelfth rib and using a lead system that does not directly contact a patient's heart or reside in the intrathorasic blood vessels and for providing anti-bradycardia pacing energy to the heart, the method comprising:

generating anti-bradycardia pacing energy;
storing the anti-bradycardia pacing energy; and
delivering the anti-bradycardia pacing energy to the patient's heart.

80. The method of claim 79, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 500 volts.

81. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 25 volts.

82. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform

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having a peak voltage that is approximately 25 volts to
approximately 50 volts.

5 83. The method of claim 80, wherein the anti-
bradycardia pacing energy comprises a biphasic waveform
having a peak voltage that is approximately 50 volts to
approximately 75 volts.

10 84. The method of claim 80, wherein the anti-
bradycardia pacing energy comprises a biphasic waveform
having a peak voltage that is approximately 75 volts to
approximately 100 volts.

15 85. The method of claim 80, wherein the anti-
bradycardia pacing energy comprises a biphasic waveform
having a peak voltage that is approximately 100 volts to
approximately 150 volts.

20 86. The method of claim 80, wherein the anti-
bradycardia pacing energy comprises a biphasic waveform
having a peak voltage that is approximately 150 volts to
approximately 200 volts.

87. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 200 volts to approximately 250 volts.

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88. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 250 volts to approximately 300 volts.

89. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 300 volts to approximately 350 volts.

90. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 350 volts to approximately 400 volts.

91. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 400 volts to approximately 450 volts.

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92. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 450 volts to approximately 500 volts.

93. The method of claim 70, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 2 milliseconds to approximately 40 milliseconds.

94. The method of claim 93, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 2 milliseconds to approximately 10 milliseconds.

95. The method of claim 93, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 10 milliseconds to approximately 20 milliseconds.

96. The method of claim 93, wherein the anti-bradycardia pacing energy comprises a biphasic waveform

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having a pulse width that is approximately 20 milliseconds to approximately 30 milliseconds.

5 97. The method of claim 93, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 30 milliseconds to approximately 40 milliseconds.

10 98. The method of claim 79, wherein the anti-bradycardia pacing energy comprises a biphasic waveform further comprising a positive voltage portion and a negative voltage portion.

15 99. The method of claim 98, wherein the positive voltage portion further comprises a tilt of approximately 10% to approximately 90%.

20 100. The method of claim 99, wherein the tilt is approximately 50%.

101. The method of claim 98, wherein the negative voltage portion further comprises a tilt of approximately 10% to approximately 90%.

102. The method of claim 101, wherein the tilt is approximately 50%.

5 103. The method of claim 79, wherein the anti-bradycardia pacing energy comprises a biphasic waveform that is provided at a rate of approximately 40 to approximately 120 stimuli/minute.

104. The method of claim 103, wherein the biphasic waveform is provided after a patient's heart rate is equal or less than approximately 20 beats/minute.

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